

The Bayou Observer



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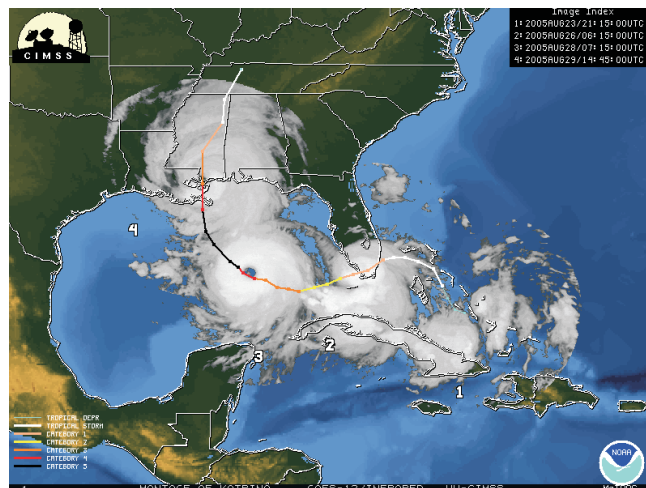
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Special Katrina Coverage: The Making of a Monster

The following outlines the conditions that led to the development, intensification and track of Hurricane Katrina as it moved from near the Bahamas, across Florida and into the Louisiana/Mississippi coasts. The information was taken from the National Hurricane Center Tropical Cyclone Report written by Richard Knabb, Jamie Rhome and Daniel Brown. The full report can be accessed online at the following address:

http://www.nhc.noaa.gov/pdf/TCR-AL122005_Katrina.pdf.

The storm system that would become Hurricane Katrina began showing signs of organization on August 19th as a tropical wave moving through the Leeward Islands merged with a mid-level circulation that originated with



tropical depression 10. The system showed few signs of further organization over the next day or two mainly due to upper level shear from a trough over western Atlantic and Bahamas. As the shower and thunderstorm activity associated with this newly formed circulation continued to move slowly northwestward, the upper trough weakened and the system was able to strengthen into a tropical depression on the 23rd.

Without the upper level shear that had been impeding development, the depression was able to strengthen throughout the day and overnight. By the morning of the 24th, deep convection had developed on the eastern half of the storm and a well-defined band of convection wrapped around the northern side of the center of circulation. This led to further intensification, and Katrina was named at 7 am CDT on the 24th.

Initially, Katrina maintained its northwestward motion within a weakness in the lower-level subtropical ridge. However, as the storm continued to evolve into a deeper tropical cyclone, it began to feel the influence of a strengthening mid-level ridge. This mid-level ridge located over the northern Gulf of Mexico forced Katrina to take a more westerly path. As Katrina moved toward Florida, deep convection continued to become more organized around the low-level center of circulation. This helped the storm intensify and Katrina became a hurricane around 4 pm CDT on the 25th less than two hours before making landfall on the southeastern coast of Florida.

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Special Katrina Coverage: The Making of a Monster continued

As Katrina made its way across the Florida peninsula, an eye feature became well defined on radar imagery. Taking only 6 hours to cross the peninsula, Katrina re-emerged into the Gulf of Mexico around midnight CDT the night of August 25th. As Katrina re-emerged into the Gulf of Mexico, it continued on a west-southwesterly path under the influence of the strong mid- and upper-level ridge.

Warm waters and low wind shear over the Gulf of Mexico allowed Katrina to regain hurricane status quickly. In fact, once over the Gulf of Mexico, Katrina underwent two periods of rapid intensification (an increase of 34 mph or greater in 24 hours or less). These periods of rapid intensification were - at least in part - due to very weak wind shear and efficient upper-level outflow over the

storm. The first period of rapid intensification took Katrina from a 65 kt (75 mph) minimal hurricane to a 95 kt (110 mph) strong category 2 hurricane by midnight CDT the night of the 26th. The storm continued to strengthen and by the morning of the 27th, Katrina had become a category 3 hurricane with a clearly visible eye on satellite imagery. Throughout the remainder of the day, Katrina's inner eyewall collapsed as a secondary outer eyewall formed. As is often the case during eyewall replacement cycles such as this, Katrina's intensity leveled off at 100kt (115 mph) during this process. Concurrent with this eyewall replacement, Katrina's wind field expanded significantly. Katrina had doubled in size by the end of the day with tropical storm force winds extending out 140 miles from the center of circulation.

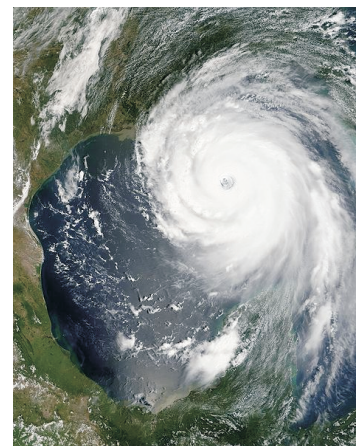
Also on the 27th (and continuing into the 28th) a mid-latitude trough amplifying over the north-central U.S. caused the ridge that had been controlling Katrina's motion to move eastward toward Florida. This pattern change allowed Katrina to take a turn to the west and then the northwest around the periphery of the ridge.

As Katrina moved westward on the 27th, the new eyewall tightened as the second round of rapid intensification took place. Katrina intensified from a low-end category 3 hurricane to a 145 kt (170 mph) category 5 hurricane in only 12 hours by about 7 am CDT on the 28th. Katrina attained its peak intensity of 150 kt (175 mph) later that day. As Katrina continued intensified, its wind field continued expanding. By the evening of the 28th, tropical storm force winds extended out 200 miles from the center and hurricane force winds extended out 90 miles from the center - making it an exceptionally large storm.

As Katrina turned more to the north late on the 28th, the southern side of the eyewall began to erode. Concurrently a second outer ring of convection became more consolidated in what appeared to be the beginning of another eyewall replacement cycle. As these internal changes in the storm's structure took place, Katrina weakened significantly, with maximum wind speeds dropping to 110kt (125 mph) before landfall at Buras, LA around 6 am CDT on the 29th. After landfall, Katrina continued northward around the periphery of the ridge, making a second landfall near the mouth of the Pearl River with an estimated intensity of 105 kt (120 mph).

The weakening could be at least partially attributed to several different factors - the collapse of the inner eyewall, entrainment of dry air, gradually increasing wind shear, slightly lower ocean temperatures or even interaction with land. But while the maximum winds had diminished before landfall, Katrina remained a very large storm and the extent of tropical storm and hurricane force winds was nearly the same at final landfall as it was during peak intensity.

As a final side note, Katrina's large wind field was at least partially responsible for the tremendous storm surge that Katrina was able to produce. Another factor contributing to the large storm surge was that during the 24 hours before landfall, when Katrina was a category 4 or 5 hurricane, it was able to build up a substantial wave set up - with buoy 42040 south of Dauphin Island reporting a significant wave height of 30 ft as early as 7 pm CDT on the 28th.

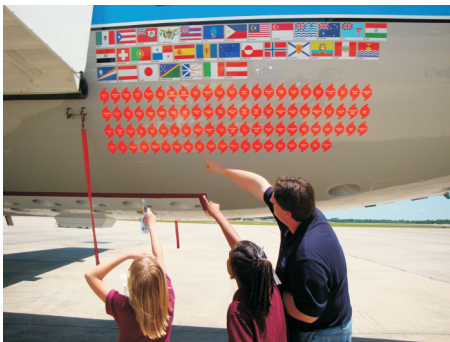


LIX in the Community Past Outreach Events

Danielle Manning

The spring and summer months are always a busy time for outreach. From office tours to large events off station, the past 6 months were no exception.

On March 24, WFO LIX held a "Weather 101" workshop for the New Orleans area Federal Executive Board. Five members of the WFO LIX staff and one of our neighbors from the Lower Mississippi River Forecast Center prepared and gave several presentations concerning weather and hydrology services and preparedness. The workshop was attended by over 50 high-level federal employees from around the New Orleans area and was designed to help them with their weather-related emergency planning and decision-making.



The bi-annual Gulf Coast Hurricane Awareness Tour took place in Baton Rouge on April 28. Approximately 300 students from 6 different schools attended the event. The students listened to a presentation about hurricanes and hurricane safety and were then given "boarding passes" to see the highlight of the event—a NOAA P3 hurricane hunter plane. Some of NOAA's hurricane hunters were on the plane to give students a tour and also answer any questions. After the tour, the students visited exhibits by several other emergency preparedness groups such as the Coast Guard and Baton Rouge 911 service.

Earlier this month, representatives from WFO LIX and the Lower Mississippi River Forecast Center helped staff the NOAA booth at the New Orleans Seafood Expo. This event draws thousands of participants each year. The NOAA booth at this annual event is typically staffed by NOAA Fisheries employees, but included several other NOAA entities this year as well. NWS employees answered general weather and hydrology as well as any questions about the NWS response to the Deepwater Horizon Oil Spill.

In addition to these larger events, we gave several tours to groups as large as 15 to 20 boy scouts to groups as small as a parent and child. The tours typically include a stop at each station in our operational area with an explanation of our daily duties and depending on the time of day, they conclude with the evening upper air balloon launch!



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National Weather Service
62300 Airport Road
Slidell, LA 70460
Phone: 504-522-7330
Fax: 985-649-0357

Internet Address
<http://www.srh.noaa.gov/lix/>

Meteorologist-in-Charge:
Kenneth Graham
Warning Coordination Meteorologist:
Frank Revitte
Science and Operations Officer:
Mike C. Kozlarski
Lead Editor: Danielle Manning
Internet Editor: Phillip Grigsby
Graphical Editor: Freddie Zeigler

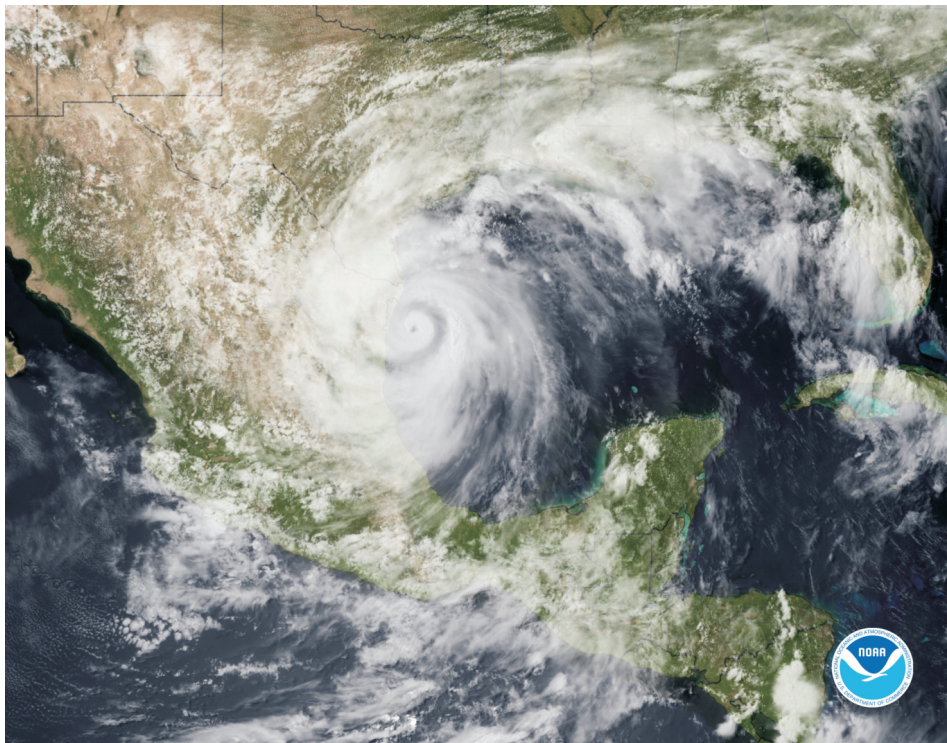


2010 Atlantic Hurricane Season Outlook

Earlier this month, NOAA's Climate Prediction Center issued a revised outlook for the 2010 hurricane season. Across the entire Atlantic basin, the updated outlook projects a total of:

- 14 to 20 named storms
- 8 to 12 hurricanes
- 4 to 6 major hurricanes

These numbers include activity that has occurred thus far. This revised outlook reduces the upper bounds of each range, but still represents an active season. The averages for the Atlantic basin are: 11 named storms, 6 hurricanes, and 2 major hurricanes. To date this season (August 24), there have been 4 named storms (Alex, Bonnie, Colin and Danielle) and 2 hurricanes (Alex and Danielle) and 0 major hurricanes.

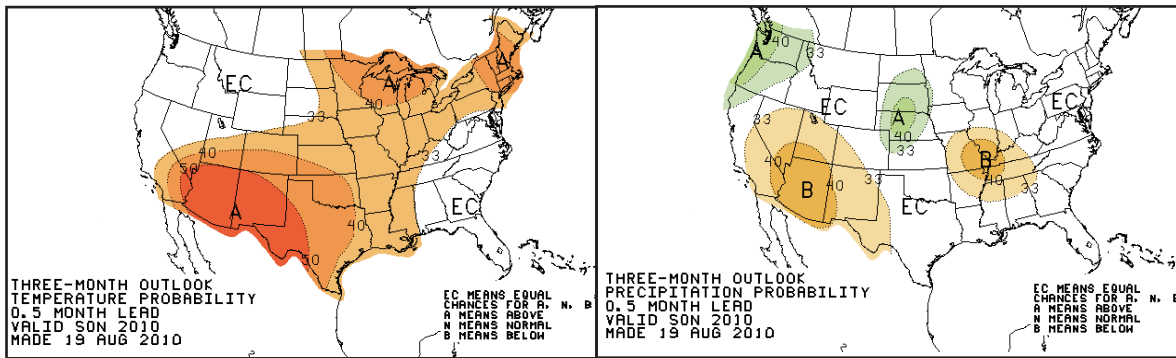


With almost half of hurricane season over, the outlook may appear to be off track, but remember that we have not yet reached the climatological peak of the season. Late August through September is typically the most active period of the Atlantic hurricane season. During this period, tropical waves leave the African continent more frequently and are more likely to develop into tropical storms or hurricanes. (In fact, the National Hurricane Center gives the wave behind Hurricane Danielle a 90% chance of developing.) Another important thing to remember is that an active season will not necessarily be a “bad” season and an inactive season will not necessarily be a “good” one. The 2000 season saw 15 named storms including 8 hurricanes 3 of which strengthened into major hurricanes. These numbers make 2000 an “active” season. However, of those 15 named storms, only 2 made landfall in the continental U.S. one as a minimal hurricane and the other as a tropical storm. Conversely, the 1992 hurricane season saw only 6 named storms an inactive season by all accounts. Similar to 2000, only 2 of those storms made landfall in the continental United States. However, the first storm was Hurricane Andrew a category 5 hurricane that at the time was the costliest storm in U.S. History.

Regardless of whether this season proves to be active, we are now entering what is climatologically the busiest part of the Atlantic Hurricane Season. Residents along the Gulf and Atlantic Coasts should continue to monitor the tropics and review your plans for what to do in the event that a tropical system threatens the area. If you don't already have a plan, make one. While the likelihood of a tropical system affecting any one given location is low, chances are that at least one tropical system will affect some portion of the coast before the end of hurricane season. If you live in that portion, you'll be glad you had a plan!



Fall Climatology and Outlook



While autumn technically begins with the fall equinox (September 22), meteorological fall consists of the entire months of September, October, and November. The fall months can be the most pleasant months out of the year for the Gulf States. However, as cold fronts become more frequent, squall lines and severe thunderstorms become more likely as well.

For the central Gulf Coast, September can be a very active month, weather-wise, as it also contains the climatological peak of the North Atlantic hurricane season. Over the years, several storms have made landfall in Louisiana or Mississippi during the month of September. A few of the most notable September storms are Frederic (1979), Georges (1998), Rita (2005), and Gustav (2008).

The Climate Prediction Center has issued a La Nina advisory indicating that they expect La Nina conditions to last through winter. For the continental U.S., temperature and precipitation impacts due to La Nina are typically weak during the fall, but increase considerably during the winter.

September			
	High Temp (deg F)	Low Temp (deg F)	Precipitation (inches)
Normal	86-88	66-71	4.8-6.2
Record	90-93	60-65	20-25

With that said, NOAA's Climate Prediction Center is forecasting above normal temperatures for the next three months across southeast Louisiana and southern Mississippi. Concerning precipitation, there is an equal chance of normal, above normal and below normal conditions.

October			
	High Temp (deg F)	Low Temp (deg F)	Precipitation (inches)
Normal	77-80	55-60	2.9-3.8
Record	82-86	45-52	9-14

Average temperatures and precipitation for the autumn months can be found in the accompanying tables. Temperature ranges are given in the 4-5 degree increment that best captures the values for the entire area (using New Orleans, Baton Rouge, McComb and Gulfport as the basis). Actual normal values and record values may fall outside of these ranges.

November			
	High Temp (deg F)	Low Temp (deg F)	Precipitation (inches)
Normal	69-72	48-52	4.8-5.1
Record	75-77	35-40	13-18



Special Katrina Coverage: WFO LIX Before and During the Storm

Most of WFO LIX's staff was on-site during both work and non-work hours the day before landfall on Sunday August 28th. Mandatory evacuations were ordered and in place for New Orleans and surrounding areas south of Lake Pontchartrain, and for areas south of Interstate 10 and 12 in St. Tammany Parish and coastal Mississippi. The overwhelming majority of the staff lived within these evacuation zones.

The forecast track was focused on the area near lower Plaquemines Parish and the Louisiana/Mississippi border by early Saturday morning as Hurricane Katrina intensified to Category 5 strength. Hurricane watches and warnings had been in place for over 24 hours, and very strong wording was being used in our local statements as well as the National Hurricane Center advisories concerning the anticipated devastating storm surge and wind damage. The staff was involved in numerous briefings to state and local emergency managers including the Governor's Offices in both Louisiana and Mississippi beginning Thursday the 25th and continuing through the day before landfall (Sunday the 28th). Structural shoring of the WFO/RFC building was completed on Sunday in advance of tropical storm force winds - including lowering storm shutters on windows, and locking and lowering shutters on all glass entrance doors to the building. The normal process of topping off the diesel supply (about one week's worth) for the back-up generators at the office and the radar site was complete. Additionally, the well-water supply and on-site septic/sewage system were tested and ready to serve as back-up when city services failed.



Staging of sleeping supplies and locations - cots, sleeping bags, blankets, sheets, pillows was a combined effort of office purchased supplies, and from many individual staff who brought in their own. Food supplies were purchased over the weekend, and many employees emptied out their refrigerators and freezers in anticipation of widespread and prolonged power loss. As hurricane Katrina approached and made landfall Monday morning, strong tropical storm force winds of 40 to 70 mph were experienced here at the office starting late Sunday night. Hurricane force winds were common - especially in gusts and squalls - throughout much of the day on Monday. Normal operations continued at the office even after commercial power was lost as emergency generators immediately kicked in. The office here issued numerous Hurricane statements, tornado warnings, and

flash flood warnings as the rain bands and eye of Katrina made landfall. Cable service at the office allowed the staff to monitor television news coverage and reports until service was lost late Sunday night or early Monday morning. The staff was naturally very worried and shocked at the amount of devastation that was about to occur.

Operations at the office were suspended when a total loss of phone lines and communications occurred at 9:05 am CDT Monday. The National Weather Service in Mobile, Alabama immediately assumed back-up service for us. The hurricane force winds and torrential rainfall compromised the building's roof, and there were serious leaks into our operations area. Several garbage cans were set up to catch the near-constant stream of water. Fortunately, there was no physical loss of roofing that would have compromised the structure and put the staff in harm's way to the elements.

One of the biggest impacts was the total loss of communications. We could not call out, and loved ones of the staff had no way of calling in to the office due to severe damage to the communications infrastructure. At this point, WFO LIX (and the co-located river forecast center) was in a world of its own - completely isolated from the outside world.



Special Katrina Coverage

WFO LIX After the Storm



In the immediate wake of Hurricane Katrina, the office quickly transitioned from an operational office into a shelter. There were about 40 people in the building - including some family members of the staff. With no communication to the outside world available, and access to the interstate limited due to flooding and downed trees, the office basically became a world unto itself. Efforts to contact Southern Region Headquarters and the National Hurricane Center proved mostly futile, but around 11 am CDT, we were finally able to get through with the help of a local amateur radio operator using a long-wave radio. Until that contact, no one from headquarters or NHC knew what affect the storm had had on our building (or the staff inside of it).

In the late afternoon on the 29th, as winds subsided, an attempt to establish communication to the outside world was also made. Some of the staff drove westward toward Baton Rouge until a cell phone signal was acquired. At that point, those staff members were able to inform national NWS officials of the current situation at the office. Brief personal calls were also made to family and friends to let them know that our staff had survived the storm.

Meanwhile, back at the office, the first order of business was obtaining potable water since the city water supply was no longer usable. Several of the Electronic Technicians and facilities people worked to connect a fresh-water well located on the property to the water supply line of the office. In addition, we conducted an assessment of food and sleeping situations. While there was a fair supply of food, it was unknown how long we would have to remain at the office. Air mattresses and cots were available as beds, but sleeping areas were spread throughout the office with the library, storage room, and other various locations being used. Another concern to be addressed was personal hygiene as the office does not have shower facilities. Fortunately, a portable shower head hookup was available and one of the bathroom stalls was set up as a temporary showering area. It was not a glamorous existence, but we were far better off than many other people in the region at that time.

A few days after the storm, scouting missions were taken to assess the damage to employees' homes. The homes of fourteen employees suffered significant damage to their homes - with most of these rendered completely uninhabitable. The remainder of the staff also experienced damage to homes and property, but were still able to return home once power and water services were restored.

By Wednesday, assistance from regional headquarters arrived at the office from Fort Worth, TX. In addition, a NOAA security detail arrived to provide protection in case of any potential looting. Fortunately, the office did not experience any serious security issues in the wake of the storm. When outside assistance arrived, conditions at the office began to improve substantially. A resupply of food and other essentials such as toiletries was sent with the assisting crew of people. People from other offices in the region came to help our employees put blue tarps on roofs and do other minor repairs as needed. Generators were also brought in which allowed those whose homes were habitable to move back in.

The arrival of people from SRH also allowed the office to reestablish outside communication with the world. A satellite phone was brought in, and a satellite connection to the internet was also set up. Additionally, Verizon agreed to supply the office with cell phones and a temporary tower which allowed the staff to contact family and friends scattered in other parts of the country. A request for temporary trailers was sent to FEMA for those employees whose homes were uninhabitable. FEMA delivered five trailers to our parking lot and these trailers were used for several months after the storm by staff members.

Full communications and power were not returned to our office until 3 weeks after the event. The office was officially able to take over our forecast operations once this occurred finally relieving the Mobile office of its backup duties.

The entire staff of WFO LIX remains very grateful for the assistance we received from those at NWS Southern Region Headquarters, the National Guard, and NOAA security.